

*Original Research Report*

## **Factors Affecting the Benefits of Baobab Plant: A Case of Kazungula District of Zambia**

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**Abstract:** There is very little information on the factors that influence the trade of baobab products and the basic market functioning factors predominantly hindering the smooth trade and commercialization of baobab products in the Kazungula district in Zambia. This study was carried out to analyze the factors affecting the trading of baobab products for improved marketing and sustainability of the trade in the Kazungula district. Purposive sampling was used to select the districts while snowballing technique was used in selecting the actors of the baobab trade. Findings show that the production factors (the price of seedlings, farm size, price of agrochemicals, expenditure on labour, and cost of irrigation and production) are among the factors that influence the production of baobab products since they are used as inputs in the baobab fruit production activities. Socio-economic and institutional factors also influence a farmer's economic benefits. The socio-economic factors influence the efficiency of a farmer. The study's policy recommendations are expected to play a feedback effect in improving profit efficiency and economic benefits of baobab fruits at all levels. Further, improved livelihoods and income levels are anticipated. This is anticipated to have a feedback effect on profit efficiency, institutional and socio-cultural factors through improved and informed use of inputs, the alteration of the current socio-cultural aspects of the rural farmers, and institutional services accessibility.

**Keywords:** Adansonia digitata, Baobab, Novel, Pulp, Velvet

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## 1. Introduction

Baobabs (*Adansoniadigitata*) can be used to provide plant products that can support the livelihoods of millions of people. In particular, many poor and marginalized people can trade these plant products for their survival. To say the least, the baobab plant not only provide seed oil but are also used for food, fibre and medicine. Fruit and leaves for this tree are an important source of nutrition and its bark is used for fiber. It should be mentioned here that, baobab products have been bartered and sold in urban and informal markets across Africa for many hundreds of years (Chadare, 2000). The more recent interest in baobab seed oil has resulted in a surge of fruit harvesting operations in many parts of the tree's distribution.

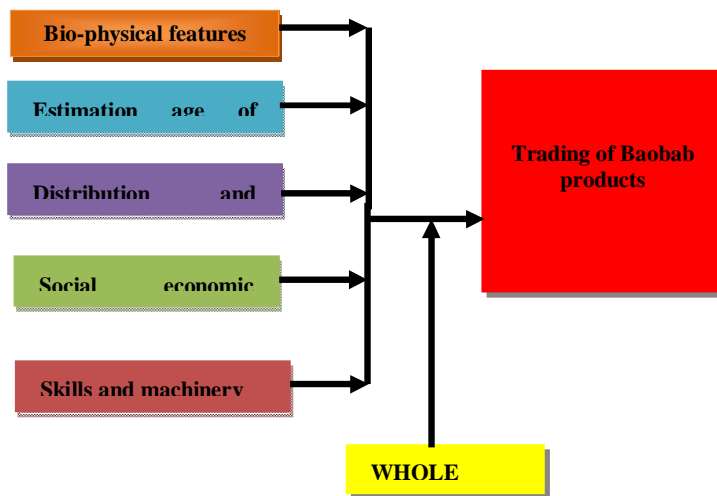
In this case, the Baobab trade has the potential to be a billion-dollar industry for the continent of Africa and could employ over 2.5 million households, especially for rural dwellers if it is fully exploited (Hazel, 2005). Recently, baobab fruit pulp has been approved for sale in the European Union (EU) and United States of America (USA), and has thus entered the formal international food market offering opportunities for income generation for African farmers (European Union, 2008). The most important EU importers of baobab fruit powder are Germany, France, and the Netherlands, while the most important exporters of baobab products are France, Germany and the United Kingdom (UK) (Hazel, 2005). In the EU in 20013, the import value of baobab pulp grew by 16% while the export value grew by 13% (Chadare, 2000). Research in Sudan, Mali, and Benin are some of the African countries selling and using baobab products at a large scale (De Caluwe, 2011).

In Southern Africa, PhytoTrade Africa lobbied with European countries to allow baobab pulp import as a novel food product (PhytoTrade Africa, 2008). The aim was to increase economic growth in the rural areas of Southern Africa based on the sustainable commercialization of baobab. PhytoTrade Africa procures baobab products, especially pulp, from Southern Africa for export to international markets (PhytoTrade Africa, 2008). For example, an estimated 80% of Malawians depend on baobab for subsistence and household income (Sanchez, 2011). In Zambia baobab is extremely important for the livelihood of rural Zambians such that both rural and urban communities use most parts of the tree. Baobab fruit pulp is eaten raw or mixed with porridge (Chirwa et al., 2006). Baobab is also processed into juice and ice-lollies and seeds are roasted and eaten (Chakma, 2011). Fiber from bark is used to make ropes, mats, hats and crafts (Gibbon, 2005).

The immense importance of these plant resources in many parts of Africa and Zambia in particular has forced this researcher to conduct a study which aims at finding out how this plant can be used to generate income for youths of Mukuni village in Kazungula district of southern province of Zambia where the baobab tree grow in abundant. If people of Mukuni Village can be educated on the importance of the baobab plant and if they can be given the means to turn this abundant plant into the products, these people would earn their lives out of it. This is because, very little is known about the impact of the fruit collected from the surrounding communal lands, fields and Mukuni village by harvesters living in the area, mainly unemployed women and youths. Although baobab is an important commercial product in most parts of Zambia, trade is predominantly informal (Gibbon, 2005). Some Mukuni villagers have created vicious circle characterized by a lack of business organization, limited access to formal finance, and unreliable labeling and quality standards. Their markets are not organized and lack bargaining power when selling their products and, hence, offer low value added products that attract low prices. In general, the fruit commercialization is poorly developed in this area. The immature fruits are eaten by monkeys. This study, therefore, aims at identifying the mechanisms on how Mukuni villagers can turn baobab fruit into various fruit products and calls for government policies to facilitate the marketing of

these fruit products for Mukuni villagers especially the unemployed youths and women to earn a living from the business.

### 1.1. Conceptual Framework



**Figure 1:** Conceptual Framework

Figure 1 derives the Conceptual Framework and if followed closely this frame provide the factors affecting the community from fully enjoying the benefits of baobab fruit tree. In Zambia, trees are of great use especially to rural or peasant farmers whose life solely depends on agricultural productions. This is because most of the rural economy in the country is agricultural; this has contributed a lot in the discovery of so many potential uses of the trees and their products. This makes the country to possess combination of trees and the vegetation which are very beneficial in more than one way.

### 1.1. Statement of Problem

The indigenous baobab plant is a very important plant which can be produced into different fruit products. To say the least, the baobab plant has been shown to be a billion dollar industry for the continent of Africa. It has also been harvested and sold in urban and informal market across Africa for many hundred years. Countries like Sudan, Mali and Benin are involved in the selling and use baobab products at a large scale. It has been proved also that 80% of Malawians depend on baobab for sustenance and household income. Unfortunately, very little information is available on the extent to which the baobab plant is important among the Mukuni people (who only do the business of curios which actually involve cutting of trees) and the basic market functioning involved in the trade of the products in general. Sadly, there is a generally lack of legislative and regulatory policies in baobab marketing in area, research and extension and there is need for good knowledge in characterization of baobab fruit, and an in-depth knowledge in baobab marketing and specifically how the people of Mukuni village in Kazungula district can capitalize on this information to be successful domesticators of baobab fruit products linked to its commercialization and market exploitation. Most of the fruits are eaten by monkeys prematurely. This study is therefore, necessary to undertake to address the problems elucidated above. Hence, the researchers realize the great need of shifting from the minimal use of baobab tree product to commercial utilization of baobab tree products extractions and to international marketing level.

### *1.2. Purpose of the Study*

The purpose of the study was to find the factors affecting the benefits of baobab plant in Zambia. Specifically, the research sought to find out:

- (a) Factors affecting the benefits of baobab plant in Mukuni village.
- (b) Type of people is involved in the trade of baobab products in Mukuni village.
- (c) Levels of awareness of baobab usage on the local people of Mukuni village.

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### *1.3. Research Questions*

This study was designed to answer the following questions:

- (a) What are the factors affecting the benefits of baobab plant in Mukuni village?
- (b) What type of people is involved in the trade of baobab products in Mukuni village?
- (c) What are the levels of awareness of baobab usage on the local people of Mukuni village?

## **2. Materials and Methods**

### *2.1. Design for the Study*

This study adopted both quantitative and qualitative research design. A descriptive design was implored. Questionnaires and interview guide was used.

#### *2.1.1. Ethics Approval of Research*

The researchers got an introductory letter to conduct the research from Rockview University that works under the Ministry of Higher and Tertiary Education. Participants' informed consent was obtained.

### *2.2. Area of the study*

The study was conducted in Kazungula-Southern Province in Zambia

### *2.3. Population and Sample*

The study consisted of 200 members of participants of between 18 years and 50 years who are targeted for the study out of the total number of 1800 population. The participants were both genders as trading of baobab product involve both sexes. This research study was adopted a qualitative design and was also employed two qualitative sampling procedures. This study was adopted qualitative design for all of the objectives as the research was in the form of a survey. In this approach, surveys involve emerging questions and procedures. Data is collected in participant's setting, data analysis is built from particular to general themes, and the researcher makes interpretations on the meaning of the data collected. Individual as well as group surveys were carried out to get both individual and collective responses.

### *2.4. Instrument for Data Collection and Study Procedure*

In collecting data for this research, the following instruments were used: semi-structured interview guides for one-on-one and Focus Group Discussions, observation schedule and a questionnaire. This instrument was used to aid in gathering information that is visible and can be noted without any explanation from the people around. It was like this mostly with the things to do with the physical appearance of the environment at which the study activities is taking place, the way the villagers do with baobab tree and fruits in productive work as well as their general behaviour towards its use. This was done as the researcher go round the target areas to see how baobab fruit has been used in these villages for their economic benefit. The FGD guide was useful especially in this study considering the fact that the purpose of this study is to find out and describe how the economic benefit of baobab fruit can be maximized by villagers by the help of the government in economic development. The interviewer was asked both structured and open-ended questions. The aim is to obtain in-depth information from the house hood heads in terms of trading of baobab fruit activities that take place in villages.

### 2.5. Data Collection Technique

In collecting data for this research, the following instruments were used: semi-structured interview guides for one-on-one and Focus Group Discussions, observation schedule and a questionnaire. This instrument was used to aid in gathering information that is visible and can be noted without any explanation from the people around. It was like this mostly with the things to do with the physical appearance of the environment at which the study activities is taking place, the way the villagers do with baobab tree and fruits in productive work as well as their general behaviour towards its use. This was done as the researcher go round the target areas to see how baobab fruit has been used in these villages for their economic benefit. The FGD guide was useful especially in this study considering the fact that the purpose of this study is to find out and describe how the economic benefit of baobab fruit can be maximized by villagers by the help of the government in economic development. The interviewer was asked both structured and open-ended questions. The aim is to obtain in-depth information from the house hood heads in terms of trading of baobab fruit activities that take place in villages.

### 2.6. Data Analysis Technique

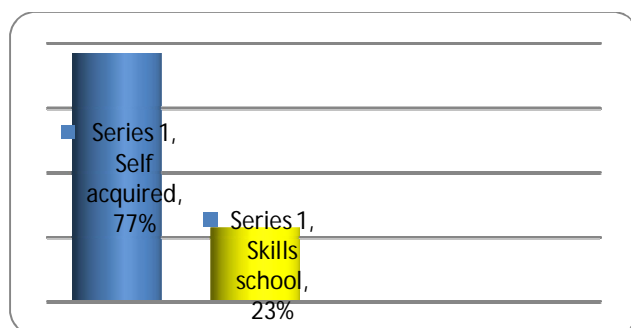
In this study, data was analyzed mainly qualitatively. The data obtained through interviews and Focus Group Discussions was analyzed by coding and categorization of the emerging themes. Some qualitative data was converted manually and summarized in order to obtain concise measures of the data by using descriptive statistics. The data was then being presented quantitatively as percentages and in frequency tables using a hand calculator. Data was analysed using a computer package called statistical package for social science.

## 3. Results and Discussion

### 3.1. Factors affecting the Trading of Baobab products

#### 3.1.1. Skill and machinery

The processors are semi – industrial processors they process wide variety of product which means they have no product specialization. 77% of processor has learnt the skills from their parents and 26% has went to Skills Education School. The processors find it difficult to process items like coffee and jewelries due to lack of machinery (see Figure 2).



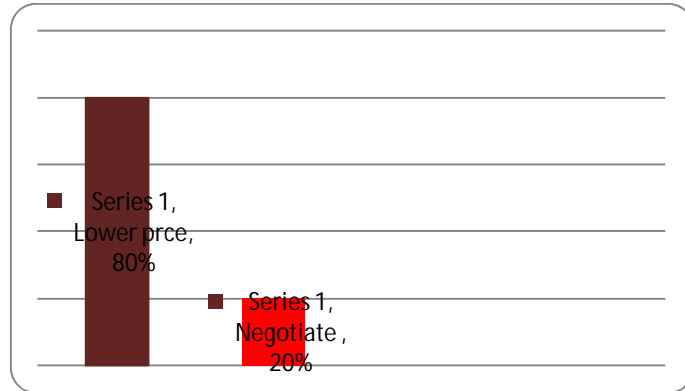
**Figure 2:** Skill and machinery

#### 3.1.2. The price

The majority of respondent stated to from collectors 80% of the trader sell the fruits at the cheaper price and 20% sell the processed goods at the negotiable price (see Figures 3 and 4).



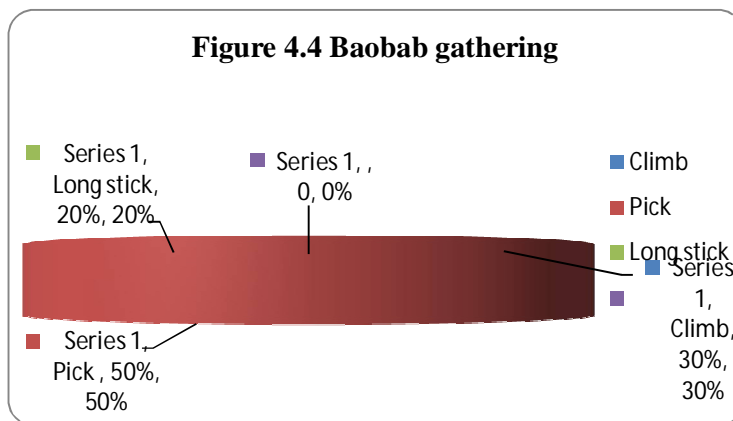
**Figure 3:** Baobab sold at a very Low price



**Figure 4:** Baobab sales

### 3.1.3. Gatherers

Gathering is one of the factors due to the Bio- physical characteristics of the baobab. Individual gatherers are part of a family or household in Mukuni Village. 50% cannot climb the baobab tree due use radar which is very steep they just pick what has fallen down and 30% climbs and 20% can pluck using the long sticks (see Figure 5). The harvesting of fresh leaves is done seasonally and is also gathered by climbing the tree. Therefore, it is essential to state in this section with an overview of the households' composition, activities and cash income, before turning to a description and identification of gatherers as being the first players in the factors influencing the trade of baobab products. The local people of Mukuni Village in Kazungula district who harvest baobab fruits using different harvesting techniques i.e. Climbing a baobab tree and with the aid of sticks (See Figures 6 and 7).



**Figure 5:** Percentage of Baobab gathering



**Figure 6:** Baobab gathering by long stick





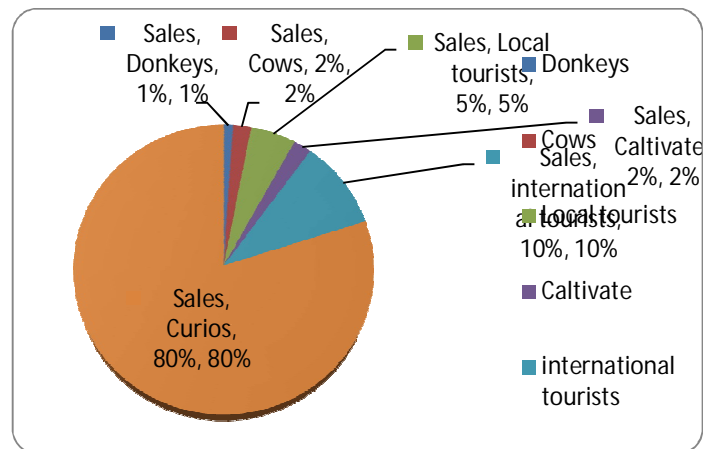
**Figure 7:** Baobab gathering by climb

#### 3.1.4. Wild animals

The wild animals affect the baobab gathering from the bush is difficult. The trader households are surrounded by the Mosi-o-tunyapark 60% had challenges to trade their products and 40% manage to transport them through 10 vehicles of the local people.

#### 3.1.5 Socio-activities

All surveyed households reported 3% keep livestock, 80% of villagers do the trading of curios, 15% entertain tourists, and 2% cultivate a variety of crops and harvest diverse products from trees. The latter are hereafter referred to as agro forestry tree products (AFTPs). Besides animal and crop production activities, which form the main cash income generating activities, 30% household members reported to be also involved in other activities in order to earn some extra cash income. Figure 8 shows socio-activities that affect the trading of baobab products in Mukuni village. Most households reported during informal interviews to derive not just one, but a number of different activities, especially from curios selling and entertaining tourists.



**Figure 8:** Social- activity per household in Mukuni Village

It was also learned that sorghum, millet, groundnut, and maize are grown. Besides baobab products, a quarter of the households in Mukuni reported to collect also other AFTPs, such as purchasing of goods from Livingstone and sell to the local people, as additional cash

income. Others are, mostly outside the agricultural season, craftsmen/-women, bricklayers, unskilled construction workers, black smiths, etc.

### 3.1.6. Household cash income

It was learned from this research that 60% of the respondents had a mean income of ZMK5, 065 and 40% of them earn below this average. This affects the selling of the baobab products in terms of transporting to the market and paying the gatherers.

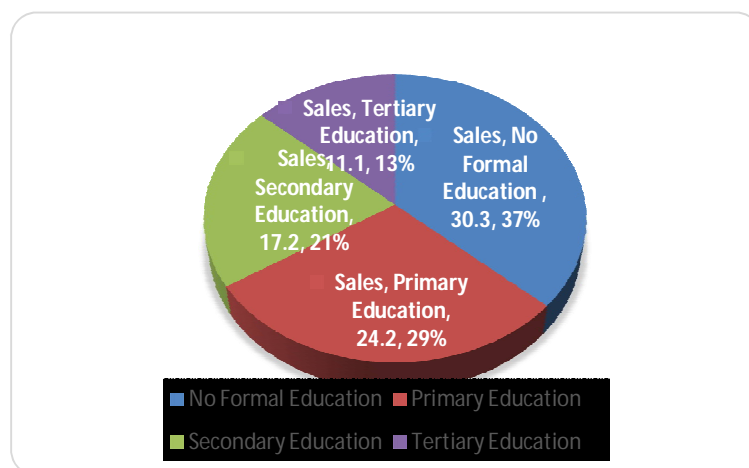
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### 3.2. The Trader's characteristics of respondents

The trading characteristics of respondents are as presented in Table 1 and it reveal that the respondents were predominantly male (64%) with a mean age of about 43 years. Majority of the respondents (62.7) had a form of formal education (see Figure 9). The average household size of about 6 is suggestive of low expense profile for many of the respondents. Though the respondents have a mean income of ZMK5, 065 about half of them earn below this average.

**Table 1: Traders Characteristics of Respondents**

Trader Characteristics	Frequency	Percentages
Age		
≤ 30	50	25.3
31-50	100	50.5 (43)
>50	48	24.2
Total	198	100
Gender		
Male	126	63.6
Female	72	36.4
Total	198	100
Household size		
≤ 6	66	33.3 (6)
>6	132	66.7
Total	198	100



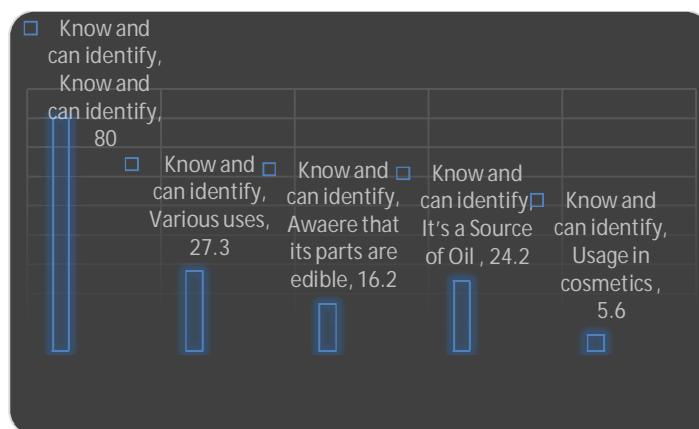
**Figure 9: Educational attainment of the farmers**



### 3.3. Level of Awareness of the Baobab usage and Trading

Table 2 and Figure 10 present the level of awareness of the Baobab usage and trading to bring income to sustain their livelihood, among the respondents. Although about 80% of the respondents know and can identify the Baobab plant, only about half of them are aware that the parts of the plant are edible. The level of awareness about the various uses of the plant is low as only 27.3% of the respondents are aware that it issued in animal nutrition, only 16.2% are aware of its usage in cosmetic and jewelry making, 5.6% are aware that it is a source of oil and can be used to make coffee. 24.2% of the respondents are aware that it has medicinal properties.

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**Figure 10:** Knowledge of baobab tree usage

**Table 2:** Level of Awareness of the Baobab Plant among Respondents

Various Aspects of the Baobab Plant	Frequency	Percentage
Knowledge of, and identification of the Baobab Plant	158	79.8
Yes	40	20.2
No	198	100
Total		
Awareness of its edibility		
Yes	100	50.5
No	98	49.5
Total	198	100
Awareness of its usage in animal nutrition		
Yes	54	27.3
No	144	72.7
Total	198	100
Awareness of its usage in cosmetics and jewelry making		
Yes	32	16.2
No	166	83.8
Total	198	100

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**Awareness of its oil and coffee producing properties**

Yes	11	5.6
No	187	94.4
Total	198	100

**Awareness of its medicinal properties**

Yes	48	24.2
No	150	75.8
Total	198	100

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### 3.4. Harvesters of baobab

After collecting the fruits, they are sun-dried, crushed into baobab pulp, packaged and supplied, sell them in to local people and Lusaka. Skilled harvesters who work individually are either owners of the trees or casual laborers employed by owners and/or wholesalers. Thirteen skilled harvesters were identified comprising 77% men and 23% women. They harvest fruits by climbing the trees (Figure 3) and the other family just collects fruits which have fallen on the ground. These harvesters sell baobab fruits and pulp to the local people, processors and final consumers (in very small quantities). They are commonly harvested by climbing the tree also or cutting the branches are common harvesting practice of baobab leaves is as soon as first leaves have developed in towards the wet season September - October. The dry leaves are sold all year round, as dry leaves and leaf powder and it is done to petty traders

### 3.5. Wholesalers of baobab

A total of twenty nine wholesalers (11% women, 89% men) were identified in this study. Wholesalers in the baobab trade in this study are vendors or middlemen who reside in the urban and semi-urban areas, respectively, but buy baobab fruits and process the in bulk from harvesters in the villages. They are no commercial traders or wholesalers of baobab product only petty traders.

### 3.6. Baobab Farm

During the research it was discovered that no information was given on the plantation of baobab plant which can assist in trading of baobab products in Zambia but other countries.

### 3.7. Institutions of baobab trade and ownership of the trees

During one of the stakeholders' meeting when disseminating the current research findings, district forest officers pointed out that the Department of Forestry only protects and manages forest reserves while trees falling on customary land are under the control and management of local or traditional leaders together with extension workers and the community members. This was verified in the forest policy that traditional leaders mobilize communities to participate in forestry programmes, develop and enforce forestry community by-laws, and implement forestry activities. This study has revealed that there has been a breakdown of community by-laws regarding use of common property resources (open access baobab trees).

It was revealed that there is no sense of ownership for community trees and access rights are free. This fear is forcing harvesters to harvest green and immature fruits which are later dried behind their backyards and also control animals feeding on premature fruits like the monkeys. The case is different with individually claimed trees whereby there is ownership of the trees and for one to access the fruits, there is a need to ask for permission from the 'owners' of the trees. There has been mismanagement of common forest resources in some parts of Zambia because of weak or no regulations. The case is different in

Kazungula district where it was discovered during investigation survey that there are strict by-laws on who have access to the community trees and time to harvest baobab fruits. The traditional leader in that area has developed and enforced by-laws and this has led to harvesters harvesting fruits which are well dried and mature. Probably due to by-law enforcement, there is a high traffic of wholesalers from the cities going to buy the quality raw materials (fruits and pulp) and this shows the importance of regulating the harvesting of baobab fruits which should be emulated countrywide.

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### *3.8. Consumers of baobab*

During data collection, it was revealed that local final consumers were identified in this study. Consumers of baobab products are found in both Mukuni village and Kamwi areas. 80% consume not only raw products but also processed products bought from informal markets. Some consumers are willing to pay for high valued products like juice in ice-lories coffee while others pay for low valued products. 20% do not consume due to religious and traditional beliefs.

### *3.9. Usage of Baobab Plant among Respondents*

The level of usage of the Baobab plant for various purposes among the respondents. It showed that 32.3% of the respondents use the baobab as a source of food; however, for most of this group, it is only consumed occasionally by adding in porridge, making ice-lollies and just consumes the pulp. This may be due to poor knowledge of the different forms into which it can be processed as available in literature and religion and traditional beliefs. While 19.2% of the respondents occasionally use the plant in animal nutrition, 12.1% and 11.1% occasionally use the baobab plant in cosmetics, jewelry making and for medicinal purposes respectively of findings.

## **4. Conclusion**

The study investigated the awareness and usage of the baobab plant in rural communities in Mukuni village in Kazungula District. The study concluded that although the plant is not well known to the people, the levels of awareness and usage of the plant was observed to be rather low compared to the potentials of the plant. The people of Mukuni are not utilizing the baobab products as discussed, they let them rot on the ground and monkeys consume them before they are ripe. The study therefore recommends that awareness should be further created on the various uses and Trading of the baobab plant through the various agricultural extension agencies in the Government. Religious as well as socio-cultural groups within the State should be involved in demystifying the plant so that the general erroneous belief held about the plant can be corrected. This study further recommends that, since Kazungula is the key producer of baobab pulp in Zambia, there is need for a domestication program of baobab to sustain production of improved products. The Department of Forestry and research institutions in Zambia should promote the domestication of baobab trees and shortening its precocity to meet the current and future demand. This study also encourages development and enforcement of by-laws by traditional leaders for communal trees and individual ownership rather than communal ownership. More research into various processing methods to which the plant can be subjected is recommended, with the outcome of such research adequately communicated through the agricultural extension agencies in the State. The Zambia wildlife authority (ZAWA) should control wild animals like monkeys and elephants that scare the traders. The government should sponsor the local people to come with baobab jewelry and coffee industry. The Government should come up with baobab plantation like what is happening from other countries to help traders

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### Conflict of Interest

The authors declare no conflict of interest.

### Author Contributions

The first and third authors conceived the study. The first and second authors distributed the questionnaires and conducted the statistical analysis. The final draft was approved for publication by all authors.

### Data availability Statement

The original contributions presented in the study are included in the article. Further inquiries can be directed to the corresponding author.

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